

CLAIMS

[1] A multimode optical transmission system for converting inputted electrical signals into optical signals, and performing multimode optical transmissions of the optical signals, the
5 multimode optical transmission system comprising:

a plurality of light sources for respectively converting the electrical signals into a plurality of optical signals respectively having different wavelengths, and respectively outputting the plurality of optical signals;

10 a wavelength multiplexing section for performing wavelength multiplexing of the plurality of optical signals outputted from the plurality of light sources, and outputting a resultant signal as a wavelength multiplexed signal;

a multimode optical transmission path for optically
15 transmitting in multimode the wavelength multiplexed signal outputted from the wavelength multiplexing section;

a plurality of optical signal extraction sections for respectively extracting, from the wavelength multiplexed signal transmitted on the multimode optical transmission path, optical
20 signals each having a mode having a particular wavelength and a particular propagation constant; and

a plurality of optical receiving sections for respectively receiving the optical signals extracted by the plurality of optical signal extraction sections, and respectively
25 converting the received optical signals into electrical signals;

wherein

the wavelengths of the plurality of optical signals
outputted from the plurality of light sources are set, such that
a propagation constant of a fundamental mode of an optical signal
5 outputted from each light source and a propagation constant of
a high order mode of an optical signal outputted from any other
light source are different from each other.

[2] The multimode optical transmission system according to
10 claim 1, wherein

the plurality of optical signal extraction sections each
include

an optical reflection section for reflecting a
corresponding one of the optical signals each having the mode having
15 the particular wavelength and the particular propagation constant,
and

a reflected optical signal extraction section for
extracting the optical signal reflected by the optical reflection
section.

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[3] The multimode optical transmission system according to
claim 1, wherein

the plurality of optical signal extraction sections each
include

25 a plurality of optical reflection sections for

respectively reflecting optical signals each having a mode having a particular wavelength and a particular propagation constant,

a plurality of reflected optical signal extraction sections for respectively extracting the optical signals reflected
5 by the plurality of optical reflection sections,

a plurality of optical delay sections for respectively adding appropriate delays to the optical signals extracted by the plurality of reflected optical signal extraction sections, and

a multiplexing section for multiplexing the optical
10 signals respectively outputted via the plurality of optical delay sections.

[4] The multimode optical transmission system according to claim 1, wherein the plurality of optical signal extraction
15 sections each are an optical filter for transmitting a corresponding one of the optical signals each having the mode having the particular wavelength and the particular propagation constant, and reflecting any other optical signals.

20 [5] The multimode optical transmission system according to claim 1, wherein

the plurality of optical signal extraction sections each include

a plurality of optical filters for respectively
25 transmitting optical signals each having a mode having a particular

wavelength and a particular propagation constant, and reflecting any other optical signals,

a plurality of optical delay sections for respectively adding appropriate delays to the optical signals transmitted through the plurality of optical filters, and

a multiplexing section for multiplexing the optical signals respectively outputted via the plurality of optical delay sections.

[6] The multimode optical transmission system according to claim 1, 2 or 3, wherein

the multimode optical transmission path is a multimode optical fiber.

[7] The multimode optical transmission system according to claim 1, 2 or 3, wherein

the multimode optical transmission path is a single mode optical fiber, and

a wavelength of an optical signal propagating through the single mode optical fiber is smaller than a cutoff frequency of the single mode optical fiber.

[8] The multimode optical transmission system according to claim 1, 2 and 3, wherein

the multimode optical transmission path is a free space

having a plurality of transmission paths.

[9] The multimode optical transmission system according to claim 2 or 3, wherein

5 the optical reflection section is a Fiber Bragg Grating.

[10] The multimode optical transmission system according to claim 2 or 3, wherein the optical reflection section is an optical filter for transmitting a corresponding one of the optical signals
10 each having the mode having the particular wavelength and the particular propagation constant, and reflecting any other optical signals.

[11] The multimode optical transmission system according to
15 claim 2 or 3, wherein the reflected optical signal extraction section is an optical circulator.

[12] The multimode optical transmission system according to claim 2 or 3, wherein the reflected optical signal extraction
20 section is a photocoupler.

[13] The multimode optical transmission system according to claim 3, wherein the plurality of optical delay sections each are optical waveguide.

[14] The multimode optical transmission system according to claim 3, wherein the plurality of optical delay sections each adjust a delay amount by changing a refractive index of an optical transmission path.

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[15] A multimode optical transmission method for converting inputted electrical signals into optical signals, and performing multimode optical transmissions of the optical signals, the multimode optical transmission method comprising:

10 a light outputting step of, by using a plurality of light sources, converting the electrical signals into a plurality of optical signals respectively having different wavelengths, and outputting the plurality of optical signals;

a wavelength multiplexing step of performing wavelength
15 multiplexing of the plurality of optical signals outputted at the light outputting step, and outputting a resultant signal as a wavelength multiplexed signal;

an optical transmission step of, via a multimode optical transmission path, optically transmitting in multimode the
20 wavelength multiplexed signal outputted at the wavelength multiplexing step;

an optical signal extracting step of extracting, from the wavelength multiplexed signal transmitted via the multimode optical transmission path, a plurality of optical signals each
25 having a plurality of modes each having a particular wavelength

and a particular propagation constant; and

a light receiving step of receiving the plurality of optical signals extracted at the optical signal extracting step, and converting the received optical signals into a plurality of electrical signals, wherein

the wavelengths of the optical signals outputted at the light outputting step are set, such that a propagation constant of a fundamental mode of an optical signal outputted from each light source and a propagation constant of a high order mode of an optical signal outputted from any other light source are different from each other.